

Other criteria for starting dialysis

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GUIDELINES

No recommendations possible based on Level I or II evidence

SUGGESTIONS FOR CLINICAL CARE

(Suggestions are based on Level III and IV evidence)

- Commence dialysis at first indication of malnutrition suspected to be due to uraemia and unresponsive to dietary intervention or correction of other reversible causes. (Level III evidence)
- Look for evidence of malnutrition once a GFR of 15–20 mL/min/1.73 m² is found, and monthly from GFR < 10 mL/min/1.73 m².
- Use of ‘absolute indications’ for dialysis initiation is a historical concept which is no longer valid, and their presence suggests delayed initiation. However, in some patients with comorbid conditions, dialysis may be indicated for these reasons even when GFR is greater than 10 mL/min/1.73m². Traditional absolute indicators include pericarditis, fluid overload and hypertension poorly responsive to non-dialytic treatment, hyperkalaemia, acidosis, advanced uraemic encephalopathy and/or neuropathy, significant bleeding diathesis, severe nausea and vomiting (Hakim & Lazarus 1995).
- Similarly, traditional ‘relative indications’ may not be useful because they are largely subjective and depend on patient perception and acceptance, and may be due to intercurrent diseases. Traditional relative indications (Hakim & Lazarus 1995) include anorexia, profound fatigue and weakness, impaired cognition, memory and attention span, severe pruritus, depression and poor interpersonal relationships.

With regards to assessment of nutrition:

- For patients in nitrogen balance, dietary nitrogen (protein) intake (DPI) is equivalent to protein catabolic rate (PCR) + protein losses or urinary and non-urinary nitrogen appearance (PNA) + protein losses.
- Approximate normalised PCR (nPCR) may be calculated by the Randerson equation (Kopple et al 1995):

$$\text{nPCR (g/kg/d)} = \{[\text{urea excretion (mmol/d)} \times 0.209] + 15.71\} \div \text{weight (kg)}$$

(see [Appendix A](#)).

For children, PNA can be derived by the modified Borah formula (Kopple et al 1995):

$PNA (g/d) = [urea\ excretion\ (mmol/d) \times 0.209] + 0.294 \times [V\ (total\ body\ water\ in\ litres)] + protein\ losses.$

- Corrected DPI can be calculated by multiplying nPCR by actual/ideal body weight. Ideal (dry) body weight can be determined from the table in [Appendix B](#).
- Malnutrition may be suggested by:
 - fall in lean body mass
 - fall in serum albumin
 - serum albumin below the lower limit of the reference range
 - nPCR < 0.8 g/kg/d
 - subjective global assessment (SGA)
 - other objective measures.

(The components of SGA are listed in [Appendix C](#)).

Background

Outcome in patients commencing dialysis for end-stage kidney disease (ESKD) depends on the presence or not of complications of renal failure (such as malnutrition) and comorbid conditions. Nevertheless, just as with level of renal function (see accompanying recommendation 'Level of renal function at which to initiate dialysis'), there are no completed randomised controlled trials (RCTs) that have examined other criteria for commencing dialysis.

Search strategy

Databases searched: Medline (1966 to April Week 2 2004). MeSH terms and text words for kidney disease were combined with MeSH terms and text words for pre-dialysis and referral. The results were then combined with the Cochrane sensitive search strategy for cohort and other prognostic studies.

Date of search: 28 April 2004.

What is the evidence?

No RCTs are available which address this issue. Most of the literature in this area focuses on nutrition. Three prospective studies have evaluated the association between nutritional status and residual renal function (RRF) at initiation of dialysis.

In a prospective cohort study of 90 patients (Ikizler et al 1995), spontaneous dietary protein intake (DPI) fell with creatinine clearance (C_{Cr}). DPI at C_{Cr} 10 mL/min was 0.54 g/kg/day, and ideal body weight fell by 0.38% for each 10 mL/min fall in C_{Cr} . The fall in spontaneous DPI was evident when GFR fell below 25–50 mL/min.

In another prospective cohort study of 67 patients (Coresh et al 1995), the 2-year mortality rate was only 7% (lower than control USRDS data) among carefully monitored patients maintained on a low-protein diet supplemented with keto- or essential amino acids.

In the CANUSA study (McCusker et al 1996), normalised protein catabolic rate (nPCR) at entry correlated with RRF at entry, and 2-year survival correlated with malnutrition as assessed by serum albumin, subjective global assessment score, % lean body mass or nPCR.

In a retrospective cohort study (Cooper et al 2003), it was found that patients ($n = 26$) with a $C_{Cr} > 10$ mL/min at initiation of dialysis were better nourished as assessed by nitrogen index and serum albumin than were patients ($n = 108$) with $C_{Cr} \leq 10$ mL/min.

In the MDRD study (Kopple et al 1994), spontaneous DPI at entry into the trial correlated with GFR. For example, DPI at GFR of 70, 45, 25 and 9 mL/min/1.73 m² were 1.07, 1.02, 0.93 and 0.80 g/kg/d, respectively.

Several other cohort or case-control studies in dialysis patients have shown an association between serum albumin at initiation of dialysis and subsequent mortality (Hakim & Lazarus 1995, Khan et al 1995, Spiegel et al 1993, Kopple et al 1995). For example, Lowrie (Hakim & Lazarus 1995) showed a progressive increase in mortality for patients with albumin at initiation of < 40 g/L, in a group of 3,487 patients commencing haemodialysis in 1988. USRDS haemodialysis data (Hakim & Lazarus 1995) also showed a progressive increase in mortality for patients with serum albumin < 41 g/L.

It is uncertain whether malnutrition is a surrogate marker for other factors that determine mortality. In dialysis patients, increased mortality is largely due to cardiovascular causes, whereas in malnourished patients with normal renal function, increased mortality is the result of infection.

The utility of other valid measures of nutrition, including transferrin, prealbumin, anthropometrics etc. has not been proven for patients initiating dialysis.

Summary of the evidence

There are no RCTs on this topic and there is no Level I or II evidence about other criteria for initiating dialysis, on which to base guidelines.

What do the other guidelines say?

There are no substantial differences between the above Suggestions for Clinical Care and other published guidelines, each of which is opinion-based.

Kidney Disease Outcomes Quality Initiative: Commence dialysis in patients with:

- anorexia (not corrected by treatment of other causes such as gastroparesis, infection, acidosis, depression), weight loss, nausea, vomiting, reduced protein/calorie intake by history.
- signs of malnutrition, based on falling lean body mass, subjective global assessment or low serum albumin.
- spontaneous nPNA < 0.8 g/kg/d (or < 0.9 g/kg/d if nephrotic).

British Renal Association: No recommendation.

Canadian Society of Nephrology: Guideline 1.3. Initiation of Dialysis. Commence dialysis in patients with clinical evidence of uraemia or malnutrition (including nPNA < 0.8 g/kg/d).

European Best Practice Guidelines: No recommendation.

International Guidelines: No recommendation.

Implementation and audit

1. Distribute to all members of ANZSN the formulae/nomograms for easy calculation of nPNA, corrected GFR, and Kt/V.
2. Monitor acceptance of the above Suggestions for Clinical Care by ANZDATA collection of entry nPCR for all new patients commencing dialysis.

Suggestions for future research

An RCT of outcome of commencing dialysis at GFR 10–14 versus 5–7 mL/min/1.73 m² is underway in Australia and New Zealand (Cooper et al 2004). This includes patients with evidence of uraemia or malnutrition.

References

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Coresh J, Walser M, Hill S. Survival on dialysis among chronic renal failure patients treated with a supplemented low-protein diet before dialysis. *J Am Soc Nephrol* 1995; 6: 1379–85.

Hakim RM, Lazarus JM. Initiation of dialysis. *J Am Soc Nephrol* 1995; 6: 1319–28.

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Khan IH, Catto GR, Edward N et al. Death during the first 90 days of dialysis: a case control study. *Am J Kidney Dis* 1995; 25: 276–80.

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Kopple JD, Chumlea WC, Gassman JJ et al. Relationship between GFR and nutritional status – results from the MDRD study [abstract]. In: Proceedings of the 27th Annual Meeting, American Society of Nephrology; 1994 Oct 26-29. *J Am Soc Nephrol* 1994; 5: 335.

McCusker FX, Teehan BP, Thorpe KE et al. How much peritoneal dialysis is required for the maintenance of a good nutritional state? Canada-USA (CANUSA) Peritoneal Dialysis Study Group. *Kidney Int Suppl* 1996; 50(Suppl 56): S56–S61.

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Appendices

Appendix A: Normalised protein catabolic rate (nPCR)

Wt (kg)	Urea excretion (mmol/d)										
	100	150	200	250	300	350	400	450	500	550	600
30	1.22	1.57	1.92	2.27	2.61	2.96	3.31	3.66	4.01	4.36	4.70
40	0.91	1.17	1.44	1.70	1.96	2.22	2.48	2.74	3.01	3.27	3.53
50	0.73	0.94	1.15	1.36	1.57	1.78	1.99	2.20	2.40	2.61	2.82
60	0.61	0.78	0.96	1.13	1.31	1.48	1.66	1.83	2.00	2.18	2.35
70	0.52	0.67	0.82	0.97	1.12	1.27	1.42	1.57	1.72	1.87	2.02
80	0.46	0.59	0.72	0.85	0.98	1.11	1.24	1.37	1.50	1.63	1.76
90	0.41	0.52	0.64	0.76	0.87	0.98	1.10	1.22	1.34	1.45	1.57
100	0.37	0.47	0.57	0.68	0.78	0.89	0.99	1.10	1.20	1.30	1.41
110	0.33	0.43	0.52	0.62	0.71	0.81	0.90	1.00	1.09	1.19	1.29
120	0.30	0.39	0.48	0.57	0.65	0.74	0.83	0.91	1.00	1.09	1.18

Appendix B: Ideal body weight

Males and females > 18 years; based on BMI [wt (kg)/ht² (m²)]

Height (cm)	Body weight (kg)
140	44
145	47
150	51
155	54
160	58
165	61
170	65
175	69
180	73
185	77
190	81
195	86
200	90

Appendix C: Subjective global assessment

Scoring

A = normal

B = mild-moderate

C = severe malnourishment

- 1. Percentage loss of dry weight in past 6 months:**
 - A: < 5
 - B: 5–10
 - C: > 10
- 2. Dietary intake – overall change, type of change, severity of change**
- 3. Gastrointestinal symptoms daily for > 2 weeks**
Nausea, vomiting, diarrhoea, anorexia.
- 4. Functional impairment – loss of strength or stamina**
- 5. Subcutaneous fat**
Infraorbital fat pads, triceps skinfold, biceps skinfold.
- 6. Muscle wasting**
Temporalis, clavicle, acromion, scapula, ribs, first interosseous, quadriceps, knee, calf.
- 7. Oedema**

Total score (A, B or C) is assigned based on the score for each component.